other time. Upon physical examination the patient was observed to be well-nourished and well-developed. Moderate lower abdominal tenderness was noted, but no masses could be felt. Upon pelvic examination the outlet was noted to be virginal. Palpation through the rectum elicited some tenderness low in the pelvis. No abnormalities were observed elsewhere.

As examination of the blood gave no evidence of acute infection, appendicitis was considered to be ruled out.

The patient was observed at intervals during the next ten months, and during that time dysmenorrhea increased and the pain finally became almost unbearable. On March 11, 1949, on the second day of the menstrual period, the patient had an attack of pain in the right lower quadrant of the abdomen. Leukocytes in the blood numbered 11,500 per cu. mm.—85 per cent mature polymorphonuclear cells and an abnormally high number of stab forms. Appendicitis was suspected, and operation was carried out immediately.

A McBurney incision was made on the right side. The cecum was not in the right lower quadrant. The uterus was bicornate with a rudimentary right horn. The incision was extended to permit adequate exploration of the pelvis and abdomen. The cecum, which was in the left lower quadrant, was brought into view and the appendix, which was normal, was removed.

The right cornu of the uterus, approximately 5 cm. in diameter, was extremely tense in appearance, with hemorrhagic areas present in the myometrium. An aspirating needle was introduced into the tissue mass and a quantity of tarry, tenacious bloody fluid withdrawn. The right cornu was dissected free from the main body of the uterus, leaving the myometrium of the main portion as intact as possible, and the opening in the right broad ligament was closed by continuous lock sutures of No. 00 chromic catgut. The muscles were approximated, and the fascia was closed. Three sutures were placed in Scarpa's fascia, and the skin was closed with clips.

Upon examination of the excised cornu it was noted that the canal in the rudimentary horn had no outlet into the vagina.

The patient recovered and thereafter had no premenstrual or menstrual pain.

DISCUSSION

Few cases of hematometra occurring in rudimentary horns of bicornate uteri have been reported in the literature. Nevertheless, since in 80 per cent of cases of rudimentary horn the horn possesses a canal which does not communicate with the vagina,[1] the possibility exists that menstrual blood may collect in the cavity of any atresic excavated horn and eventually cause hematometra. Although many surgeons believe that hysterosalpingectomy should be done in such cases since pregnancy might cause a rupture of the remaining body of the uterus, the more conservative operation was decided upon in this instance to preserve the capacity for normal motherhood.

Unilateral renal agenesis, frequently associated with uterus unicollis, was not present in this case.

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Restoration of Speech in a Patient with a Severe Wound in the Trachea

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A 30-YEAR-OLD SOLDIER in the United States Army was clearing a mine field when explosion of a mine caused penetrating wounds of both eyeballs, traumatic amputation of the right leg below the knee, piercing of the throat into the trachea below the level of the cricoid cartilage, and multiple lacerations of the face, shoulders, arms and hands. Emergency treatment consisted of insertion of a tracheotomy tube, removal of the mutilated remains of the right leg, application of dressings, and general supportive treatment.

The patient arrived at Letterman Army Hospital, San Francisco, five days after injury. Upon physical examination, pronounced chemosis of the conjunctiva and edema of the eyelids was noted. There was no perception of light in either eye. Purulent secretions were draining from the penetrating wounds of both corneas. Foreign bodies were imbedded in multiple wounds of the face, shoulders, arms and hands.

The skin and subcutaneous tissue were absent over an area two inches in diameter at the site of a wound just above the suprasternal notch and penetrating into the trachea. A No. 5 tracheotomy tube was in the center of the wound. The patient could talk well although huskily, by closing the tube with a finger. On indirect laryngeal examination paresis of the true cord on the left side was noted. The right true cord moved normally. There was no difficulty in swallowing.

During the first few weeks of hospitalization, the patient received penicillin therapy, and general supportive measures were carried out.

About four weeks after admittance to the hospital, the patient became unable to talk when he closed off the tracheotomy tube, about which the wound healed. The great mental disturbance caused by this development brought to the foreground an almost uncontrollable temper.

On bronchoscopic examination pronounced stenosis, caused by what appeared to be granulation tissue, was noted at the level of the cricoid cartilage and the adjacent tracheal rings. The stenosed area was dilated with a No. 18 (French) rubber-tipped bougie, the largest size that can be passed through an 8 mm. bronchoscope. Four days later tracheal dilators Nos. 21F and 24F were passed through the stricture. Then a No. 2 braided silk thread was passed through the larynx into the trachea and brought out through the wound in the neck. A rubber tube 7 mm. in diameter and 3.5 cm. long was fastened to the thread and introduced through the stenosed area. The short rubber tube, the upper end of which was below the vocal cords, was held below by the tracheotomy tube and kept from being coughed out by the thread.

By the same procedure four days later the tracheal tube was withdrawn and another of the same length but 9 mm. in diameter was inserted. It was left in place for ten days, then was replaced with one 10 mm. in diameter. After another ten days it was withdrawn and a tube with a diameter of 11 mm., cut at an angle across the lower end to effect a closer fit against the tracheotomy tube, was placed. The patient still could not get air around the tracheotomy tube and could not talk. Upon inspection through an 8 mm. bronchoscope it was observed that although most of the

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granulation tissue above the tracheotomy tube had been pressed against the tracheal wall, enough remained about the tracheotomy tube to block the trachea.

Several days later a 6 mm. bronchoscope was used, and as the bronchoscopic tube was introduced the tracheotomy tube was withdrawn. With a little force the bronchoscope was pushed past the granulations which had formed about the tracheotomy tube. There was some bleeding and the patient coughed considerably. From approximate measurements taken with the bronchoscope in the trachea it was determined that about 10.5 cm. of tubing would be needed to bridge well past the granulated area. Before the bronchoscope was removed, a heavy silk thread was introduced through the tracheotomy stoma, grasped through the bronchoscope and brought out the patient's mouth.

A No. 9 Portex® Magill endotracheal plastic tube, which has an outside diameter of 13 mm., was used to span the traumatized area. This particular kind of tubing was used because secretions do not cling to the smooth surface and it was felt that the material of which it is made would be the least irritating to tissues. The section used was 10.5 cm. long, including the diagonally cut tip. The diagonal tip facilitated introduction of the tube through the larynx and the stenosed area of the trachea. To prevent its slipping, a No. 2 braided silk thread was passed through the anterior wall of the tube 3.5 cm. from the upper end and tied to the thread previously placed in the trachea. The larynx was exposed with a Jackson laryngoscope and the diagonal edge of the "Portex" tube was introduced into the glottic chink. Grasped at the upper end in laryngeal forceps and with a 4 mm. bronchoscope inside as a stylette, the tube was slipped into the trachea as the slack of the braided silk thread was taken up. The tube settled into place well below the true vocal cords and caused little irritation. The patient was able to breathe easily through the tube and was immediately able to talk. The thread emerging on the anterior surface of the neck was anchored to a one and one-half-inch length of the same kind of tubing.

The plastic tube caused the patient very little discomfort. In oblique roentgenograms of the neck and chest on Feb. 27, 1951, after the tube had been in place fourteen weeks, columns of air about the upper and lower ends of it were noted. There was an area about 4 cm. in length, below the glottis, in which there was no air between the tube and the trachea. The left true vocal cord was again functioning normally.

On April 2, 1951—the tube had then been in place about four and one-half months—the supporting braided silk thread broke and the tube slipped into the right main stem bronchus. It was removed, and on bronchoscopic examination of the trachea at that time a few small pedunculated granulations were observed at the level of the upper end of the intratracheal tube when it was in place. The granulations were removed with a cupped forceps. At the previously stenosed area there was flattened granulation tissue over an area of 3 to 3.5 cm., most of it on the posterior wall but with some extension to the lateral walls. Farther down there was no evidence of tracheal damage. The anterior wall of the trachea was smooth and there was no granulation at the site of tracheostomy. Clinically the airway seemed to be adequate.

The intratracheal tube that was removed was darker in color than it had been when it was inserted but there was no evidence that it had deteriorated in either consistency or elasticity during the four and one-half months it was in place.

In roentgen studies with Lipiodol,® some reduction in the lumen of 3 or 4 cm. of the upper trachea was noted (Figure 1).

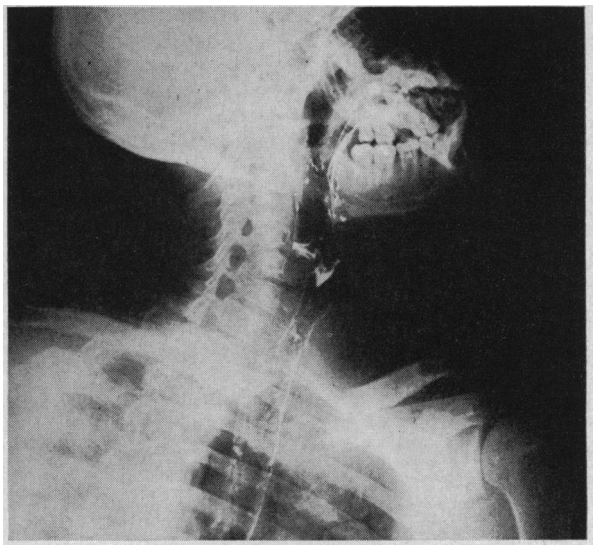

Figure 1.—Lipiodol® outline of the trachea after removal of intratracheal plastic tube, which had been in place about four and one-half months.

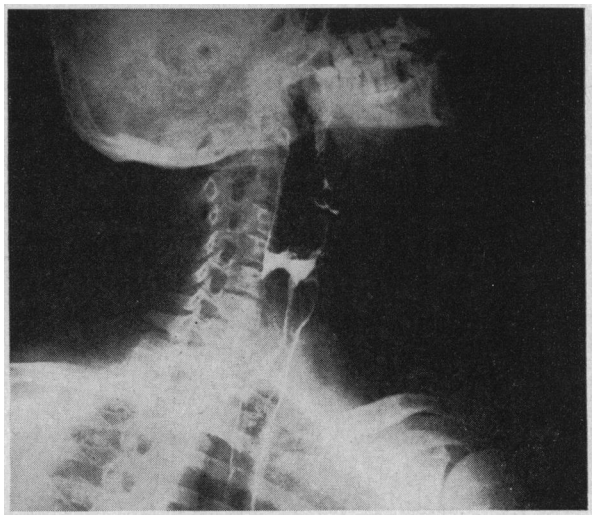

Figure 2.—Outline of trachea two months after removal of intratracheal plastic tube. The lumen was reduced to 7 mm. at the narrowest part.

Two months later the trachea was again outlined with Lipiodol® and a similar oblique x-ray film was made. The tracheal lumen was reduced from 11 mm. to 7 mm. at the narrowest point (Figure 2).

Although the patient had no symptoms of respiratory obstruction, significant wheeze was noted when he was in certain positions, most notably when he leaned forward, and it appeared that further measures would be necessary to maintain an adequate airway.

On June 11, 1951, a No. 9H Portex tube, thicker walled than the one previously used but of the same outside diameter and length, was prepared as before except that, for purposes of fixation, .026 tantalum wire was inserted through the posterior wall 3.5 cm. from the top of the tube. The two ends of the wire were brought around the sides of the tube and twisted together snugly on the outside of the anterior wall. The tube was inserted in the trachea (Figure

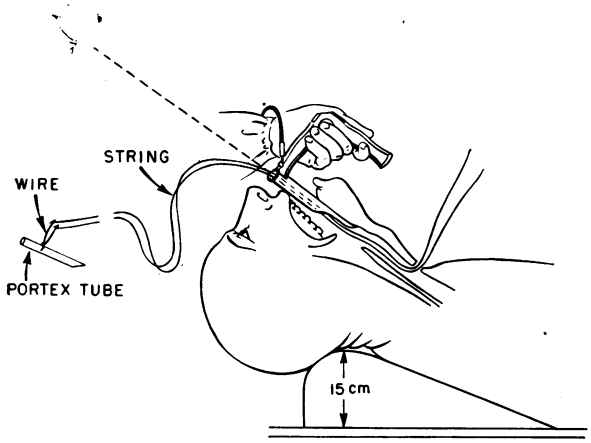

Figure 3.—Method of introduction of plastic tube into the trachea. The block under the back of the head and shoulders kept the trachea straight.

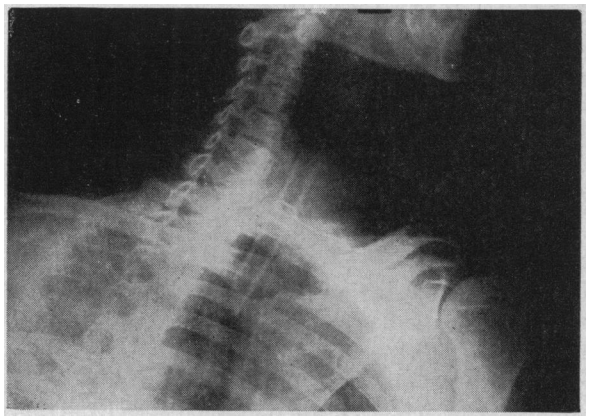

Figure 4.—Intratracheal tube held in place by tantalum wire.

3) and the ends of the wire were brought through the anterior wall of the trachea and anchored to a short piece of tubing on the surface of the neck.

Paroxysmal coughing occurred after the new tube was in place. Indirect examination indicated that it was caused by irritation of the subglottal area by the upper end of the tube. The supporting wire was readjusted, but the tube did not settle sufficiently to correct the situation. After three days it was removed, shortened by 6 mm. at the upper end so that it would not traumatize the inferior aspects of the true vocal cords, and reinserted (Figure 4). It was not removed again until nine months later, and the patient reported that in the interim it had caused no discomfort.

DISCUSSION

Methods of fixing or supporting the intratracheal tube by stiff wires passed through the lower portion of the thyroid cartilage and then cut short beneath the skin[1] were considered. Inasmuch as both the true vocal cords were uninjured and the nerve supply was functioning, it was deemed inadvisable to risk further surgical trauma upon the thyroid cartilage. Further, it was felt that passing a very sharp straight needle through the plastic tubing required so much force that considerable intralaryngeal damage might be done.

The use of intratracheal split thickness skin grafts[1] to the traumatized area was considered. However, as the extent of the injury was so ill defined at first,[3] and as the patient was tolerating the plastic tube so well, it seemed advisable not to interfere with whatever spontaneous regeneration of respiratory epithelium and tracheal cartilage might take place.[2] Now that the tube has been removed, how much the tracheal lumen will be reduced from contraction of the fibrous tissue will depend to some extent upon the opposing spring of the tracheal cartilages. Future observation will be necessary.

SUMMARY

A soldier received a wound in the trachea that caused complete stenosis and speechlessness. A plastic tube placed in the trachea was well tolerated for long periods providing the tube did not touch the inferior aspects of the true vocal cords, and with the tube in place the patient could talk.

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